PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-221-M-2

STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

Lake Tyler West

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Tyler West were surveyed in 2011 using electrofishing and trap netting and in 2012 using gill netting. Vegetation and angler access surveys were conducted in August 2011. A roving creel survey conducted from March 2012 through May 2012, collected angler use and harvest information. This report summarizes results of the surveys and contains a management plan based on the findings.

- **Reservoir Description:** Lake Tyler West is a 2,224-acre reservoir on Prairie Creek, a tributary of the Angelina River in Texas. The reservoir was built to provide water for municipal and industrial purposes. Boat and bank access were adequate. Although facilities were generally accessible to the physically-challenged, none were specifically marked as ADA approved. Due to low water level, native emergent vegetation, normally forming a narrow fringe around the reservoir, was exposed. However, native submersed vegetation and hydrilla were more abundant than in previous surveys.

- **Management History:** Important sportfish include sunfishes, channel catfish, white bass, largemouth bass, and crappies. The reservoir is currently managed under the statewide fishing regulations. Biennial electrofishing surveys were conducted to assess the reservoir's largemouth bass population. Advanced fingerling channel catfish stockings were conducted from 2004-2010. Supplemental largemouth bass sampling was conducted in 2009, and fingerling stockings were conducted in 2008, 2009, and 2011.

- **Fish Community**
  - **Prey species:** Threadfin shad and gizzard shad were present in the reservoir, but bluegill were the primary forage species. Electrofishing catch rate of sunfishes ≤6 inches was higher than average and provide excellent prey availability for all sport fishes.

  - **Catfishes:** Channel catfish were more abundant than they were in past surveys, but the fishery appears to be supported by cooperative stocking by TPWD and the City of Tyler Water Utilities rather than natural recruitment. Directed angling effort for catfish has increased.

  - **White bass:** Stocked in 1993, white bass continue to provide a fishery but do not appear to recruit every year. Directed angling effort for this species is low.

  - **Largemouth bass:** Largemouth bass continue to be the most sought after species by anglers at Lake Tyler West. Strong year classes were produced in 2007 and 2011, and size structure and abundance continued to improve. Growth is average, and body condition is good.

  - **Crappie:** Crappie were the second-most sought after sportfish group during creel surveys. Both white crappie and black crappie were present with black crappie the dominant species. Relative abundance continues to be low.

  - **Management Strategies:** Continue biennial electrofishing, and stock Florida strain largemouth bass as warranted. Re-evaluate use of rearing ponds to produce advanced-size channel catfish. Continue annual vegetation monitoring. Promote Lake Tyler West angling opportunities through news releases. Continue providing TWU with information about the threat of invasive species.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Tyler West from June 2011 through May 2012. The purpose of this document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2011 and 2012 data for comparison where appropriate.

Reservoir Description

Lake Tyler West is a 2,224-acre reservoir on Prairie Creek, a tributary of the Angelina River in Texas. The reservoir was built to provide water for municipal and industrial purposes. Lake Tyler West was eutrophic and had a mean TSI *chl-a* of 50.5 (Texas Commission on Environmental Quality 2007). The littoral zone consisted of a variety of physical habitat types (Table 4). Ott and Bister (2004) reported that the majority of the shoreline was featureless (44%) or a combination consisting of bulkhead and boat docks (23%). Boat access was limited to one (of two) public ramps and one marina ramp during the survey due to low water conditions; bank angler access was available at city park locations. There were no handicap-specific facilities, but most were accessible. Other descriptive characteristics for Lake Tyler West are found in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Beck and Ott 2008) included:

1. Conduct biennial electrofishing surveys to monitor largemouth bass and prey populations.
   Action: Additional electrofishing was conducted in fall 2009, and standard electrofishing was conducted in fall 2011.
2. Assist the City with the rearing of fingerling channel catfish *(Ictalurus punctatus)* to an advanced size (9-12 inches TL) and release into Lake Tyler West; continue marketing stocking activity through media contacts; conduct an additional gill net survey during 2010 to help evaluate stocking.
   Action: Rearing and stocking of channel catfish was conducted annually through 2010; optional gill net survey was not conducted.
3. Coordinate with the City and Master Naturalists in constructing and deploying artificial structures; consult with the City regarding native aquatic plant establishment
   Action: Bamboo structures were constructed by Master Naturalists but were deployed on the East Lake due to greater demand. A funding proposal for native vegetation enhancement was submitted to the Southeast Aquatic Resources Partnership (SARP) in 2010 but was not accepted.
4. Increase promotion of fisheries, particularly the availability of white bass *(Morone chrysops).*
   Action: Lake-specific regulation posters were provided to vendors of angling-oriented businesses serving the Lake Tyler West vicinity. Local outdoor writers were provided with news releases and information regarding the fishery.

Harvest regulation history: Sport fishes in Lake Tyler West were currently managed with statewide harvest regulations (Table 2). Regulations have not changed since the last survey in 2008.

Stocking history: Channel catfish and Florida largemouth bass were the most frequently stocked species at Lake Tyler West. Channel catfish were stocked annually from 2004-2010 through a cooperative effort with the City of Tyler to compensate for limited natural recruitment. After 2010, stocking was temporarily discontinued due to poor returns in rearing ponds. Florida largemouth bass *(Micropterus salmoides floridanus)* were initially stocked in 1997 and have been stocked periodically (most recently in 2011) to enhance the trophy potential of the fishery. White bass were collected from Lake Tawakoni in 1993 and transported to Lake Tyler West. A complete stocking history is found in Table 3.

Vegetation/habitat history: Aquatic vegetation in Lake Tyler West has historically been less abundant than it was in Lake Tyler East. Beck and Ott (2008) reported that native emergent vegetation including spatterdock (*Nuphar luteum)*, white water-lily (*Nymphaea odorata)*, and maidencane *(Panicum hemitomon)* occupied ~53 acres, primarily in the upper third of the reservoir. Native submersed vegetation, including stonewort *(Nitella* spp.*)* and pondweed *(Potamogeton* spp.*),* occupied approximately 12 acres. Hydrilla *(Hydrilla verticillata)* became locally abundant in the Hill Creek arm during the mid 1990s but disappeared without treatment by 2003. In 2006, hydrilla was re-discovered near Langeley Island and expanded to 204 acres by 2010; the expansion prompted Tyler Water Utilities to contract for an herbicide treatment in fall of that year. During summer 2011, low water level limited distribution of aquatic vegetation within 200 feet of the shoreline, and no treatment was conducted. Water hyacinth *(Eichhornia crassipes)* was identified at the marina ramp in late March 2008 and was removed by hand; no further infestation has been reported. Bister and Ott (2004) reported that littoral habitat in the lower two-thirds of the reservoir was less desirable than the upper third and consisted mainly of featureless shoreline, boat docks, and bulkhead.

Water transfer: Lake Tyler West is used primarily as a water supply for municipal and industrial purposes, and for flood control. The pump station for Tyler Water Utilities (TWU) is located on Lake Tyler West. A canal connects Lake Tyler East to Lake Tyler West, facilitating flow to the pump station and allowing raw reservoir water to be pumped directly to the treatment facility. Tyler Water Utilities maintains a second permanent pump station and treatment facility on Lake Palestine. Prior to distribution, water from the two sources is blended after leaving the treatment facilities. Tyler Water Utilities provides treated water to the City of Whitehouse.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). A vegetation survey was conducted in August 2004 and was repeated at the beginning and end of the growing season 2005 through 2011. Roving creel surveys were conducted from December 2004 through February 2005, March through May 2008, and March through May 2012. Surveys consisted of nine creel days per quarter (4 weekdays and 5 weekend days); angler counts were instantaneous and were conducted at a random start time during the survey day. All survey dates were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Stock Density (PSD), Relative Stock Density (RSD)], and condition indices [relative weight (Wr)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for gizzard shad *(Dorsoma cepedianum)* (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and for creel statistics, and SE was calculated for structural indices and IOV. Ages were determined using otoliths collected from white bass ranging from 10.5-16.3 inches (N=13) and largemouth bass ranging from 4.1-20.5 inches (N=111). Water level data were obtained from the United States Geological Survey web site (USGS 2012).

RESULTS AND DISCUSSION

Habitat: Physical habitat types and composition were similar to those reported in previous surveys. However, water level at the time of survey in 2011 was five feet below conservation pool, and much of the structural habitat and vegetation normally present was exposed. Native emergent vegetation (primarily American lotus *{Nelumbo lutea}*) occupied 5.0 acres in the upper end of the reservoir (Table 4). However, native submersed vegetation species (chara *(Chara vulgaris)* and coontail *(Ceratophyllum demersum*) were more abundant than they were in previous surveys, occupying approximately 11.5% (257 acres) of the reservoir. Hydrilla occupied an additional 4.7% (104 acres).

Creel: Directed fishing effort by anglers was highest for largemouth bass (75%) during the spring 2012 creel survey (Table 5). Crappie *(Pomoxis spp.)* was the second most sought after species group and accounted for 17% of directed angler effort. Total fishing effort for all species in spring 2012 (19,677 angler hours) was slightly below that of the same period in 2008 (20,794 angler hours), but direct expenditures were higher ($180,203) when compared to $149,163 in 2008 (Table 6).

Prey species: Both threadfin shad (*D. petenense)* and gizzard shad were present in Lake Tyler West (Appendix A). The gizzard shad electrofishing catch rate (29/h) decreased from the 2007 and 2009 surveys (97 and 118/h respectively), and the IOV was low (41), which indicated that few were of suitable prey size (Figure 2). Combined electrofishing catch rate for all sunfish species *(Lepomis* spp.*)* was 677/h (Appendix A), and most collected were ≤6 inches in length (Figures 3-5). Bluegill *(L. macrochirus)* were the most common species, but their relative abundance declined slightly from 517/h in 2009 to 443/h in 2011. Despite the slight decline, CPUE for bluegill is still higher than the 255/h reported in 2007. Sunfishes accounted for approximately 1% of the total directed angler effort (Table 5).

Catfish: Lake Tyler West supports a low-density channel catfish population with poor natural recruitment. However, gill net catch rate of channel catfish in 2012 (7.0/nn) was higher than it was in 2004 or 2008 (4.6 and 4.0/nn respectively (Figure 6). Channel catfish ≤12 inches were present on the 2008 survey but were likely the result of stocking (Table 3) rather than natural recruitment. From 2004-2010, channel catfish were stocked annually through a cooperative effort with TWU to increase abundance in the reservoir. However, stocking was temporarily discontinued after 2010 due to poor returns in rearing ponds. Although current size distribution is very good with a PSD (Proportional Size Distribution) of 80, this population is likely not sustainable without continued stockings of advanced sized (>8 inch) fingerlings. Directed angling effort for catfish was not documented during the 2004-2005 winter or 2008 spring creel surveys but made up 5% of the directed effort (928 angler hours) in 2012 (Table 5 and Table 7). Surprisingly, none of the catfish harvested were caught by anglers actually targeting them. All of the channel catfish harvested were large (>14 inch) (Figure 7).

White bass: White bass were first introduced to Lake Tyler West in 1993 (Table 3). In 2004, one specimen was collected during gill netting (Figure 8), and catch rate in 2008 (12.2/nn) was higher than it was in 2012 (2.6/nn). Beck and Ott (2008) suggested that above average rainfall in the spring of 2007 provided excellent spawning conditions for white bass resulting in a strong year class. Specimens from the 2007 year class were still present in the 2012 sample, but there was no evidence of another year class until 2011 (Figure 9). White bass were fully recruited into the legal-length size (≥10 inches) by age 1. Body condition of collected fish in 2012 was high (Wr>90) for all inch classes, suggesting adequate forage. White bass made up 1% (212 hours) of the total directed angling effort in spring 2012 (Tables 5 and 8), and the fish harvested were large (Figure 10).

Largemouth bass: Total electrofishing catch rate of largemouth bass in 2011 (182/h) was substantially higher than it was in 2009 (55/h) or 2007 (99/h) (Figure 9). Catch rate of stock-size (≥8 inch) largemouth bass has also continued to increase with each survey since 2007. A particularly strong 2011 year class is evident as represented by fish 4-8 inches in length. The strength of the 2011 year class is likely related to the increased coverage of submersed aquatic vegetation in 2011 relative to previous years. The strong 2011 cohort should influence angler catch rates as they recruit into the legal-length class (≥14 inches). Largemouth bass at Lake Tyler West are fully recruited into the legal-length category by age 3, and the growth trajectory is relatively linear out to age 8 (Figure 10). Size distribution (PSD) is within the target range of 40–70 and is similar to that of previous years. Mean relative weight (W_r) was above 95 for most length classes, indicating adequate prey availability. Forty percent of the 30 specimens collected by electrofishing in fall 2011 carried Florida largemouth bass alleles and one pure Florida largemouth bass was collected (Table 8). The largemouth bass fishery at Tyler West is the most popular of any species, representing 75% of the directed angling effort during the spring 2008 creel survey. Directed effort for largemouth bass remained similar from 15,039 angler hours in 2008 to 14,592 angler hours in 2012, but angler catch rate (1.0/h) was higher than it was in either previous survey (Table 9). Traditional harvest accounted for 6% of the largemouth bass retained during the March through May creel period (Figure 13); however, only 33% of the legal length largemouth bass caught were immediately released (Table 9). It is likely that fish temporarily

confined in live wells had a higher mortality rate than those immediately released.

Crappie: Both white and black crappie *(Pomoxis annularis and P. nigromaculatus)* were collected in 2012, with black crappie the dominant species. Trap net catch rates continued to be low: 2.6/nn for black crappie and 1.6/nn for white crappie (Figure 12 and 13). Lake Tyler West has historically exhibited low trap net catch rates of crappie and is classified as a low catch rate lake (Bonds et al. 2009). Mean W_r of both species of crappie was >90, indicating adequate prey availability. Insufficient numbers of either species were collected to allow age and growth analysis, but no growth related problems have been reported historically (Beck and Ott 2008). Crappie continue to account for a substantial proportion (17%) of the directed angling effort (Table 5). Directed angling effort (3,377 angler hours) was similar to that recorded in spring 2008 (3,707 angler hours); however, catch rate and total harvest were substantially higher (Table 11). Black crappie were the dominant species represented in the harvest (as was noted in trap net results) and the majority of fish harvested were just at or above the legal minimum-length ($\geq$10 inches) (Figure 16).

Fisheries management plan for Lake Tyler West, Texas

Prepared – July 2012

ISSUE 1: Lake Tyler West has traditionally provided a high-quality largemouth bass fishery, and it is important to local anglers.

MANAGEMENT STRATEGIES

1. Continue to conduct biennial electrofishing surveys to monitor largemouth bass and prey populations; conduct genetic analysis of the population in 2015.
2. Continue requesting Florida strain largemouth bass for stocking based on exhibited potential to produce trophy specimens.

ISSUE 2: The channel catfish population is of low density and continues to be hindered by recruitment problems. A cooperative effort between the Tyler Water Utilities and TPWD has produced and stocked 27,765 advanced fingerling channel catfish which continues to supplement the fishery. Lowered returns for fingerlings in 2009 and 2010 led to a temporary hiatus in the program while pond bottoms were allowed to dry and improve water quality.

MANAGEMENT STRATEGIES

1. Request 2-inch fingerling catfish in FY 2013 for renewed stocking of rearing ponds.
2. Evaluate success of survival when ponds are drained in 2013 and base future requests on results.
3. Determine if the City of Tyler would be willing to construct new lined ponds with catch kettles.

ISSUE 3: Hydrilla has shown the potential to be problematic, and Tyler Water Utilities has shown a desire to control abundance near shore and in residential areas by herbicide.

MANAGEMENT STRATEGIES

1. Continue annual monitoring of Lake Tyler West vegetation community as necessary.
2. Continue providing Tyler Water Utilities with information on overall coverage and spatial distribution of plant species.

ISSUE 4: Continued recruitment of white bass offers the opportunity for an additional fishery but has the potential to be an issue of concern to some anglers.

MANAGEMENT STRATEGY

1. Promote the white bass fishery in news releases in the Greater Tyler area. Provide information to the public that clarifies issues regarding inter-specific competition with largemouth bass.

ISSUE 5: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Invasive vegetation species such as giant salvinia (*Salvinia molesta*) can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and inter-basin transfer of water is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Coordinate with Tyler Water Utilities to post appropriate signage at access points around the reservoir.
2. Contact and educate local outdoor-oriented businesses about invasive species, and provide posters,

literature, etc. so that they are able to educate their customers.

3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Map existing and future inter-basin water transfers to facilitate potential invasive species responses.
6. Conduct a quantitative assessment of the aquatic plant community during routine habitat survey in 2014.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes annual vegetation survey, additional electrofishing in 2013, and routine gill netting and access surveys in 2015-2016 (Table 10).

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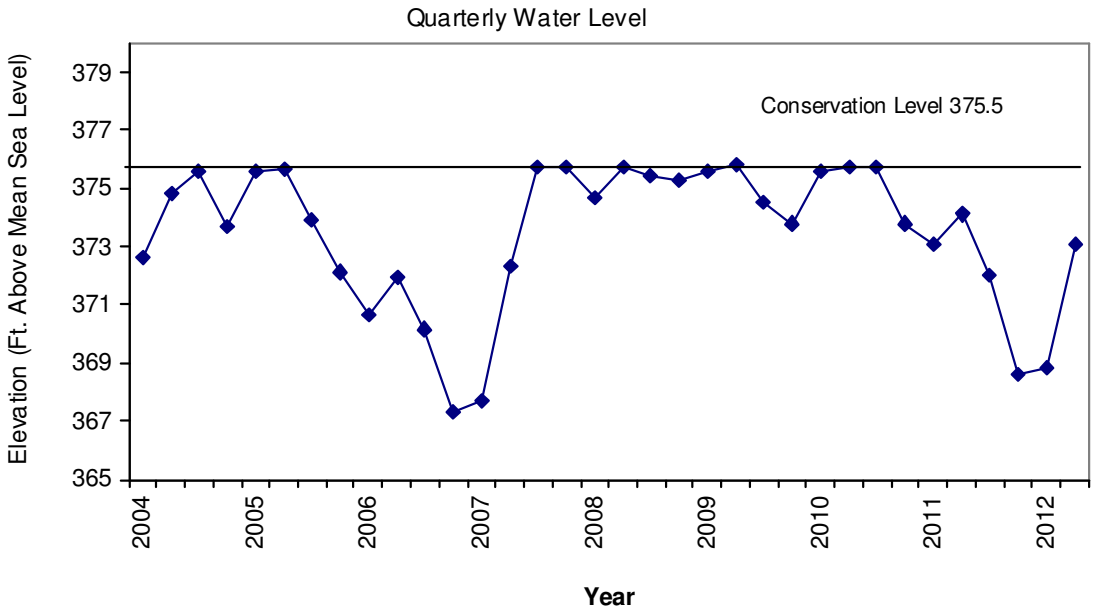


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Tyler West, Texas. Horizontal line represents conservation level.

Table 1. Characteristics of Lake Tyler West, Texas.

Characteristic	Description
Year completed	1951
Controlling authority	Tyler Water Utilities
Counties	Smith (dam)
Reservoir type	City Lake
Shoreline Development Index (SDI)	3.7
Conductivity	100 umhos/cm

Table 2. Harvest regulations for Lake Tyler West, Texas.

Species	Bag Limit	Minimum-maximum length (inches)
Catfish: channel and blue, their hybrids and subspecies	25 (in any combination)	12–No limit
Catfish, flathead	5	18–No limit
Bass, white	25	10–No limit
Bass, largemouth	5	14–No limit
Crappie: white and black, their hybrids and subspecies	25 (in any combination)	10-No limit

Table 3. Stocking history of Lake Tyler West, Texas. Size categories are FRY <1 inch; FGL =1-3 inches; ADL = adult; UNK = unknown.

Species	Year	Number	Size
Blue catfish	1975	25,000	FGL
		25,000	
Channel catfish	2004	8,000	ADL
	2005	5,000	ADL
	2006	4,450	ADL
	2007	5,000	ADL
	2008	1,990	
	2009	2,475	
	2010	850	
		27,765	
White bass	1993	192	ADL*
		192	
Palmetto bass	1975	25,000	UNK
	1977	36,136	UNK
	1979	24,500	UNK
	1980	276	UNK
		85,903	
Largemouth bass	1974	98,9000	FGL
		98,9000	FGL
Florida largemouth bass	1997	124,593	FGL
	1998	122,647	FGL
	2004	111,663	FGL
	2005	112,507	FGL
	2008	112,007	
	2009	117,125	
	2011	113,007	
		813,549	
Green X redear sunfish	1974	25,000	FGL
		25,000	

* Management stocking: adults collected and transported from Lake Tawakoni, TX.

Table 4. Vegetation survey was conducted in 2011. Surface area (acres) and percent of reservoir surface area were determined for each type of aquatic vegetation found. Water level at the time of survey was 5 feet below conservation pool. In mixed colonies the species listed first is dominant.

Shoreline habitat type	Surface area	
	Acres	Percent of reservoir surface area
Native emergent		
American lotus	5.0	0.2
Native submerged		
chara/coontail	207.0	9.3
coontail/chara	50.0	2.2
Non-native		
hydrilla	104	4.7

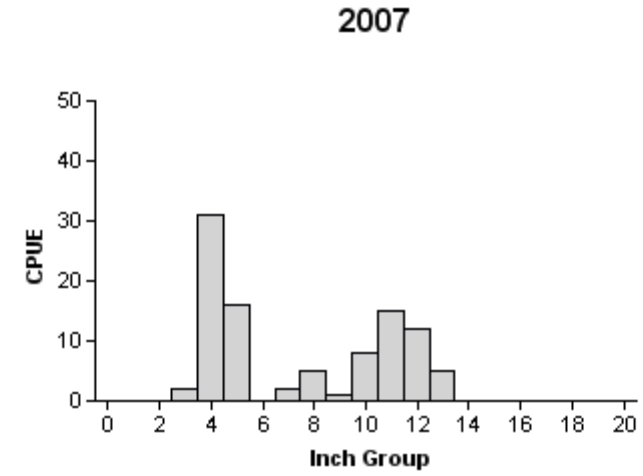
Table 5. Percent directed angler effort by species for Lake Tyler West, Texas, December 2004 through February 2005, March through May 2008, and March through May 2012.

Species	Year		
	Winter 2004/2005	Spring 2008	Spring 2012
largemouth bass	31	72	75
crappie spp.	41	18	17
sunfish spp.	22	0	1
catfish spp.	0	0	5
true basses	0	0	1
Anything	6	10	1

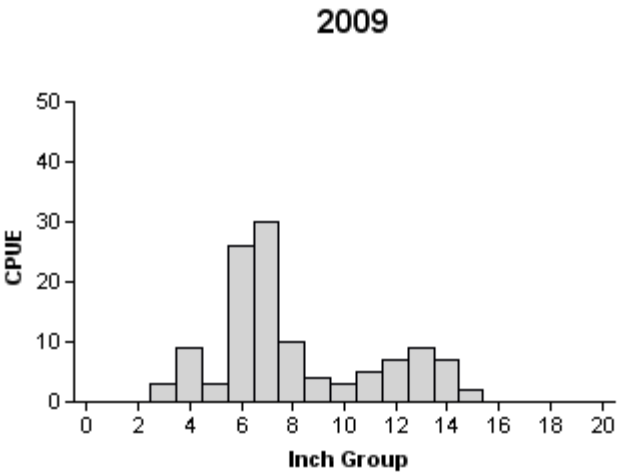
Table 6. Total fishing effort (h) for all species and total directed expenditures at Lake Tyler West, Texas, December 2004 through February 2005, March through May 2008, and March through May 2012.

Creel Statistic	Year		
	Winter 2004/2005	Spring 2008	Spring 2012
Total fishing effort	4,982	20,794	19,677
Total directed expenditures	$12,995	$149,163	$180,203

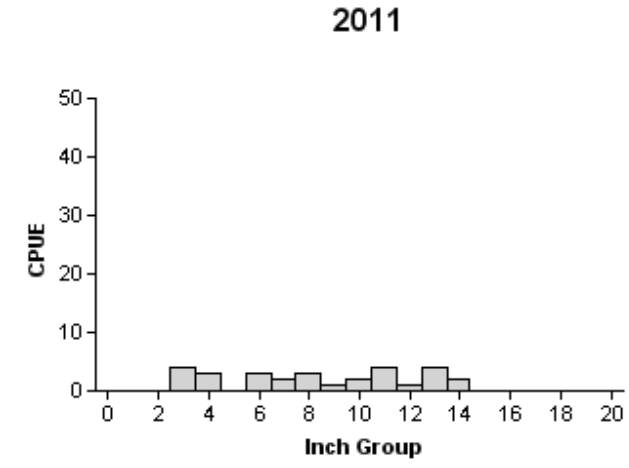
Gizzard shad



Effort = 1.0
Total CPUE = 97.0 (31; 97)
Stock CPUE = 48.0 (28; 48)
PSD = 67 (9.8)
IOV = 53 (10.5)



Effort = 1.0
Total CPUE = 118.0 (27; 118)
Stock CPUE = 77.0 (20; 77)
PSD = 39 (12.1)
IOV = 60 (9.8)



Effort = 1.0
Total CPUE = 29.0 (23; 29)
Stock CPUE = 19.0 (30; 19)
PSD = 58 (14)
IOV = 41 (13.6)

Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Tyler West, Texas, 2007, 2009, and 2011.

Redbreast sunfish

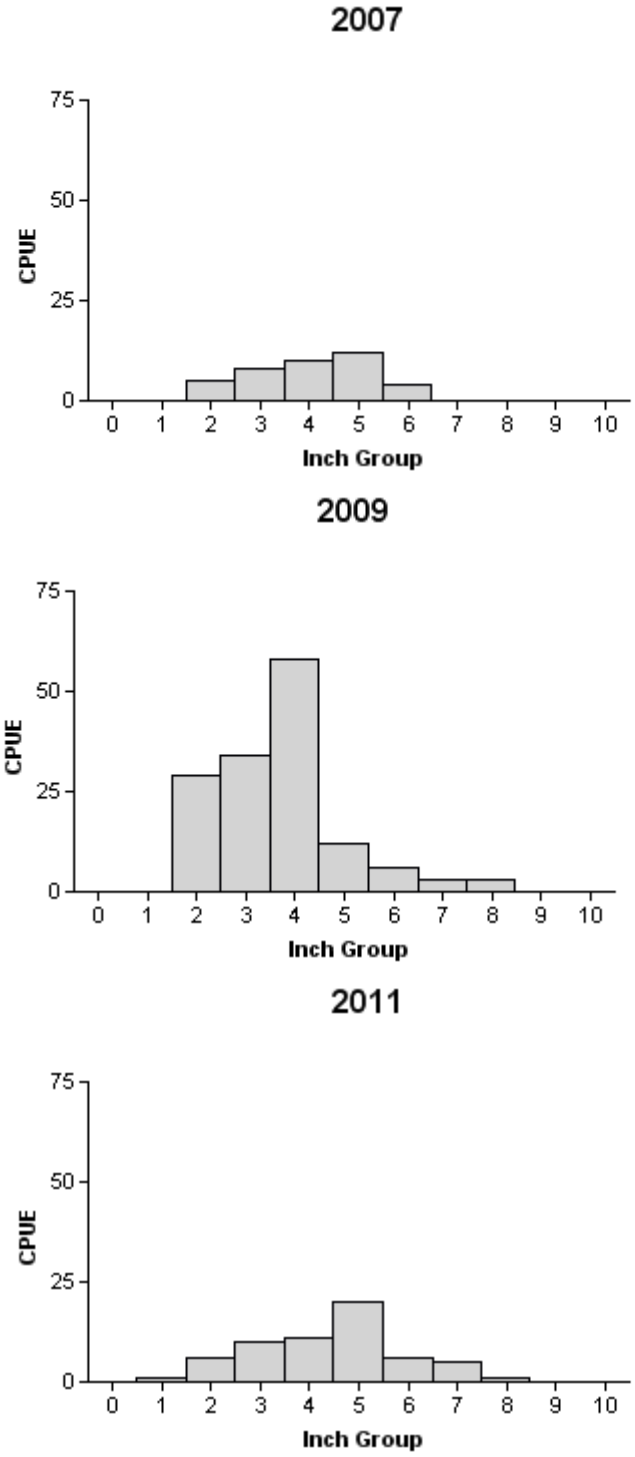


Figure 3. Number of redbreast sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Tyler West, Texas, 2007, 2009, and 2011.

Bluegill

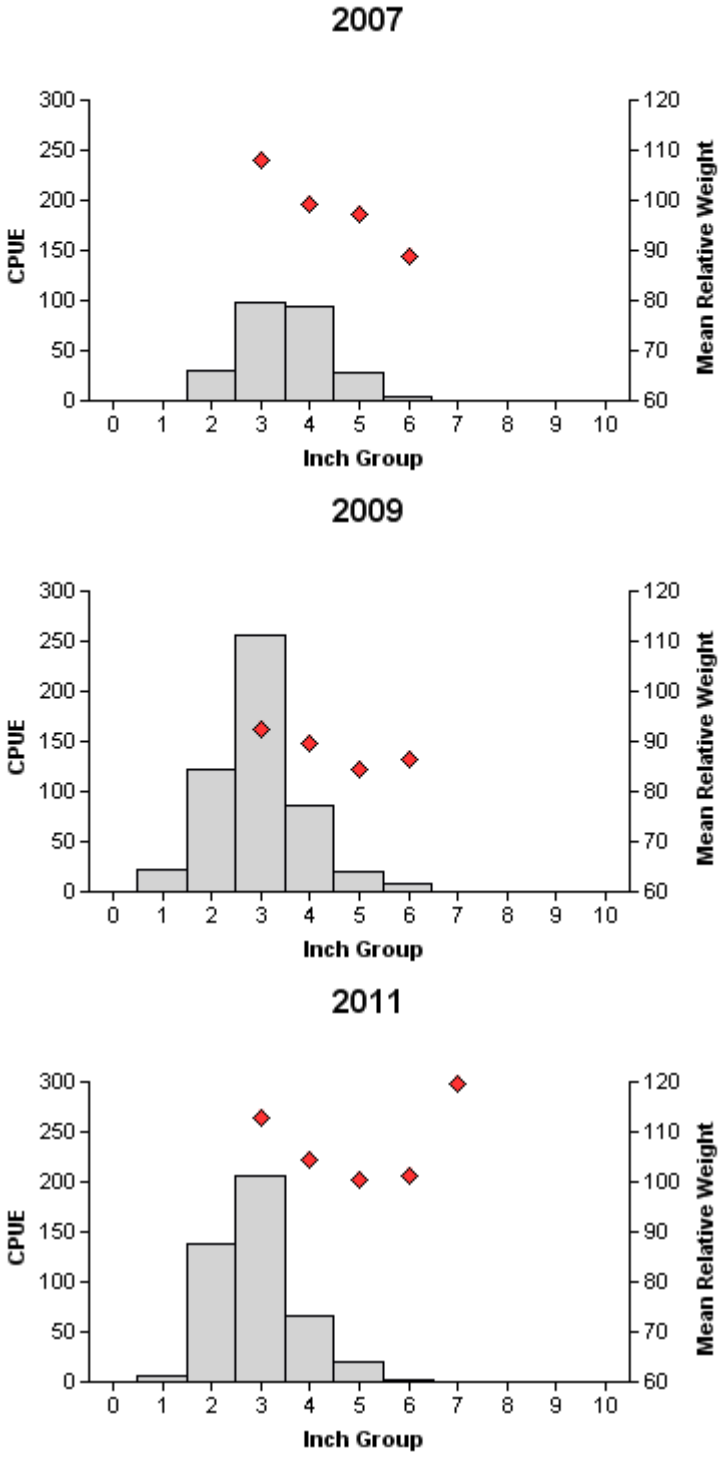


Figure 4. Number of bluegill caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Tyler West, Texas, 2007, 2009, and 2011.

Redear sunfish

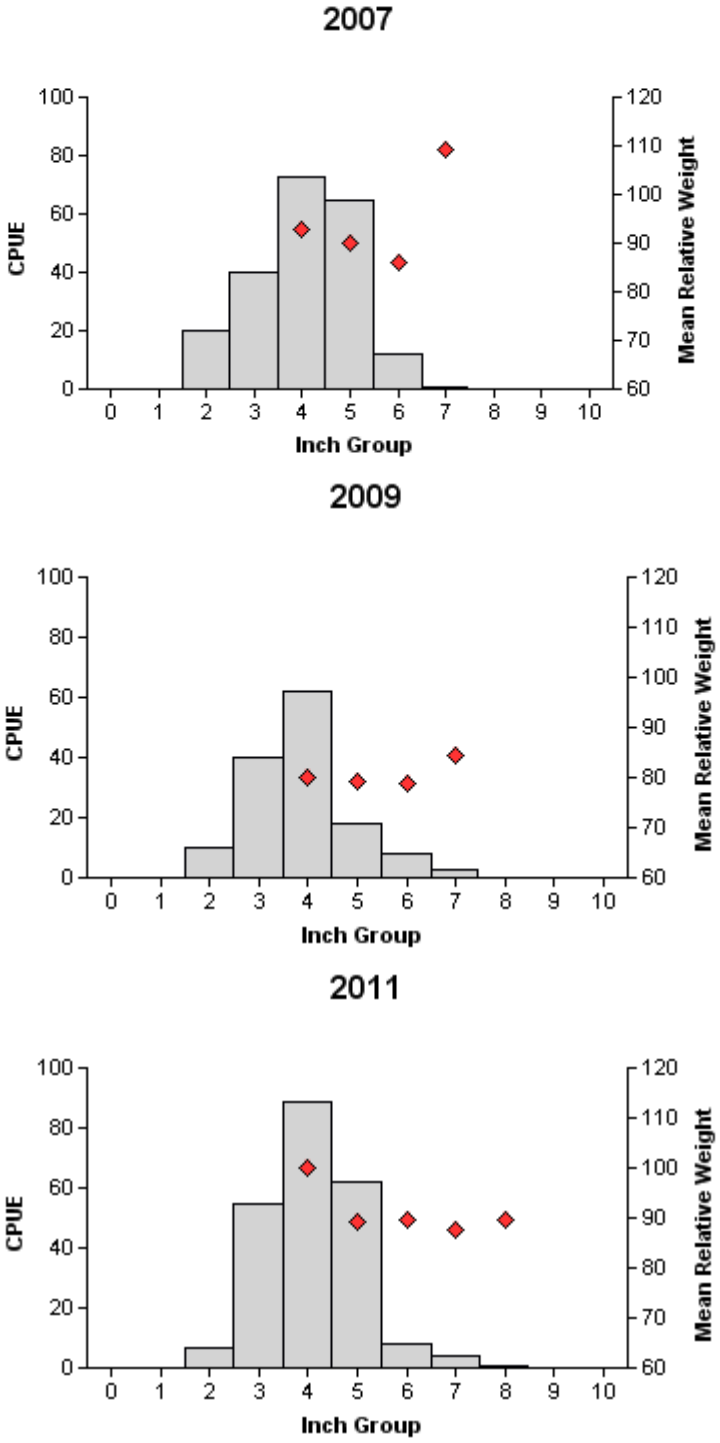
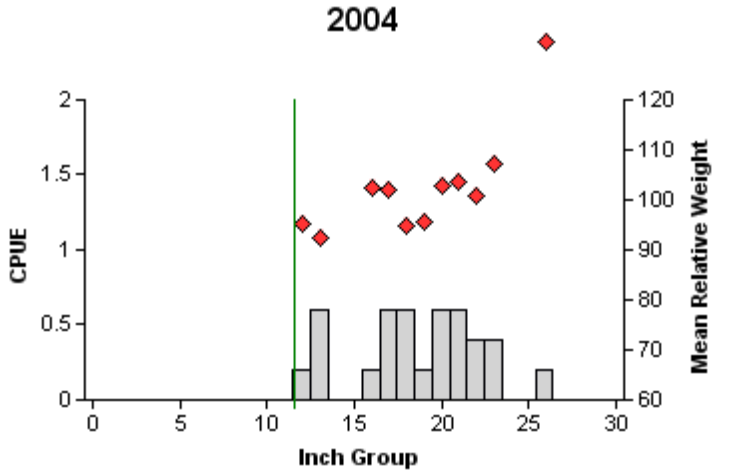
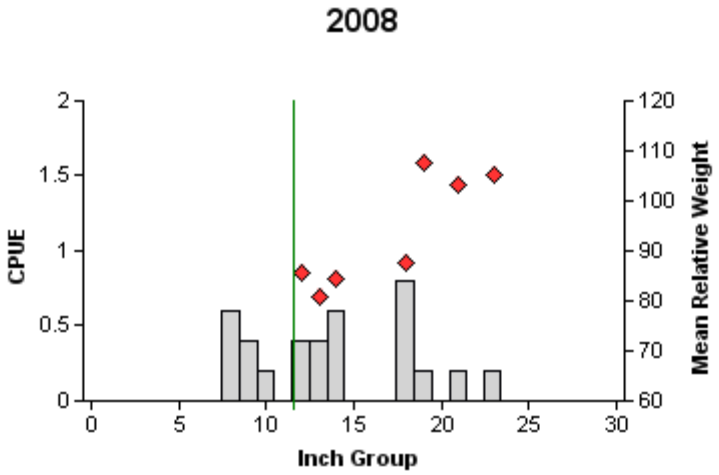


Figure 5. Number of redear sunfish caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Tyler West, Texas, 2007, 2009, and 2011.

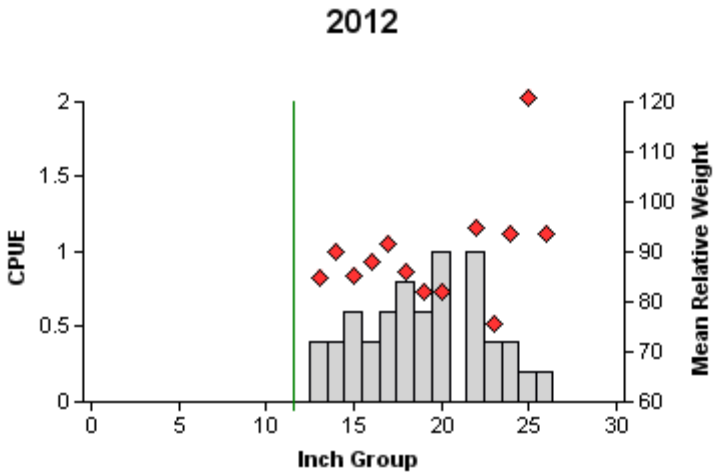
Channel catfish



Effort = 5.0
Total CPUE = 4.6 (29; 23)
Stock CPUE = 4.6 (29; 23)
PSD = 83 (6.7)
PSD-P = 4 (4.4)



Effort = 5.0
Total CPUE = 4.0 (25; 20)
Stock CPUE = 2.8 (18; 14)
PSD = 50 (8)
PSD-P = 0 (0)



Effort = 5.0
Total CPUE = 7.0 (26; 35)
Stock CPUE = 7.0 (26; 35)
PSD = 80 (4.9)
PSD-P = 11 (3.8)

Figure 6. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Tyler West, Texas, 2004, 2008, and 2012. Vertical line represents length limit at time of survey.

Channel catfish

Table 7. Creel survey statistics for channel catfish at Lake Tyler West December 2004-February 2005, March-May 2008, and March-May 2012 where total catch per hour is for anglers targeting channel catfish and total harvest is the estimated number of channel catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	Winter 2004/2005	Spring 2008	Spring 2012
Directed effort (h)	0	0	928 (58)
Directed effort/acre	0	0	0.4 (58)
Total catch per hour	0	0	0
Total harvest	0	251 (219)	413 (170)
Harvest/acre	0	0.1 (219)	0.2 (162)
Percent legal released	NA	14	0

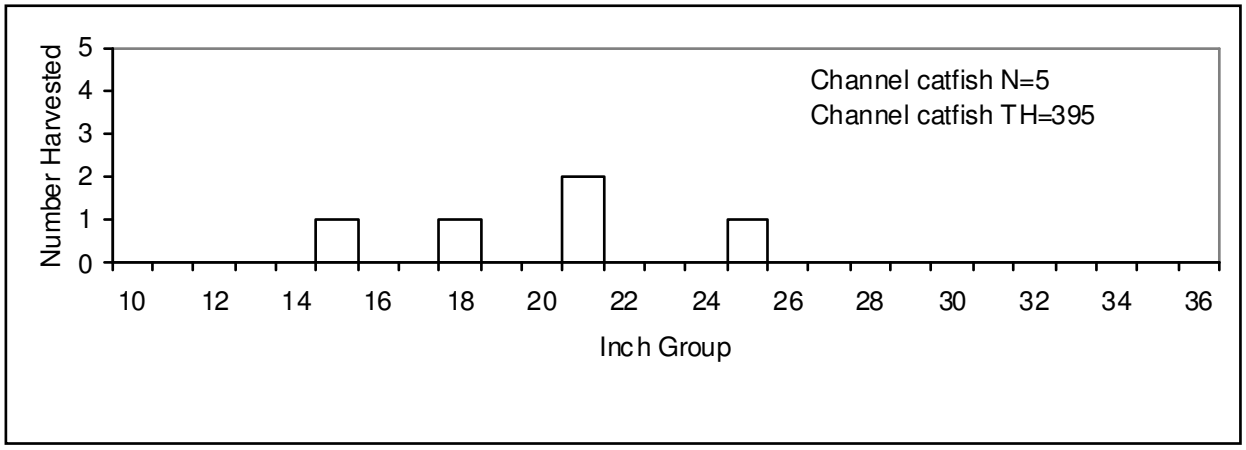
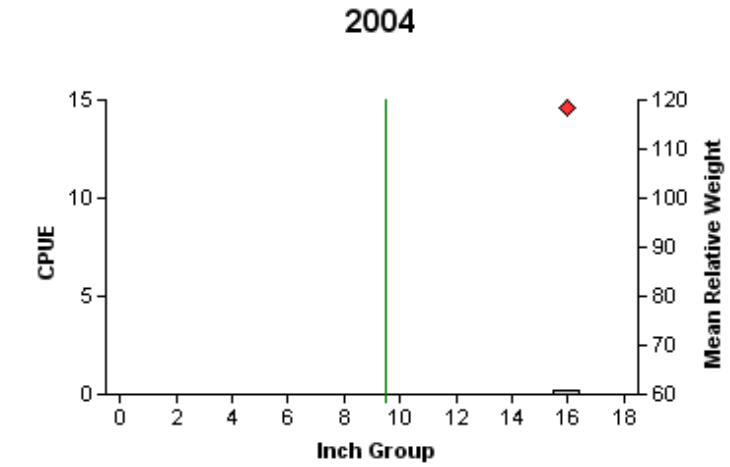
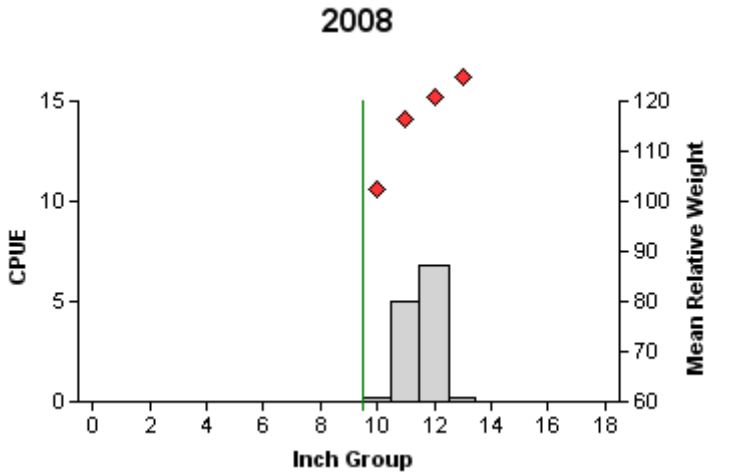


Figure 7. Length frequency of harvested channel catfish observed during creel surveys at Lake Tyler West, Texas, March–May 2012, all anglers combined. N is the number of harvested catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

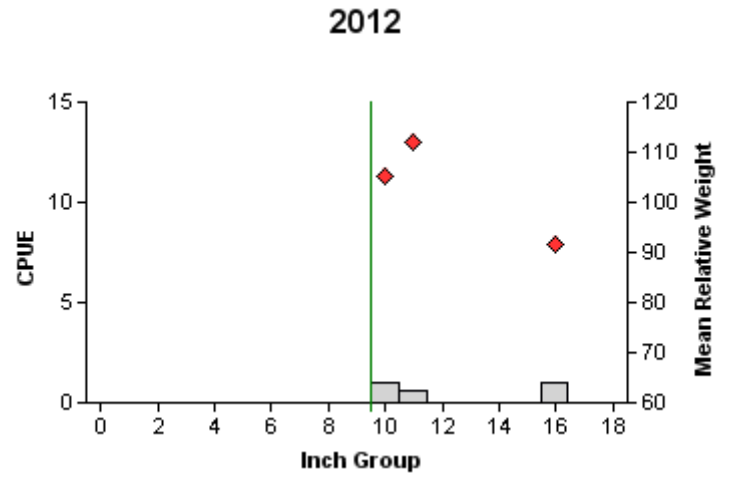
White bass



Effort = 5.0
Total CPUE = 0.2 (100; 1)
Stock CPUE = 0.2 (100; 1)
PSD = 100 (0)
PSD-10 = 100 (0)



Effort = 5.0
Total CPUE = 12.2 (63; 61)
Stock CPUE = 12.2 (63; 61)
PSD = 100 (0)
PSD-10 = 100 (0)



Effort = 5.0
Total CPUE = 2.6 (51; 13)
Stock CPUE = 2.6 (51; 13)
PSD = 100 (0)
PSD-10 = 100 (0)

Figure 8. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Tyler West, Texas, 2004, 2008, and 2012. Vertical line represents length limit at time of survey.

White bass

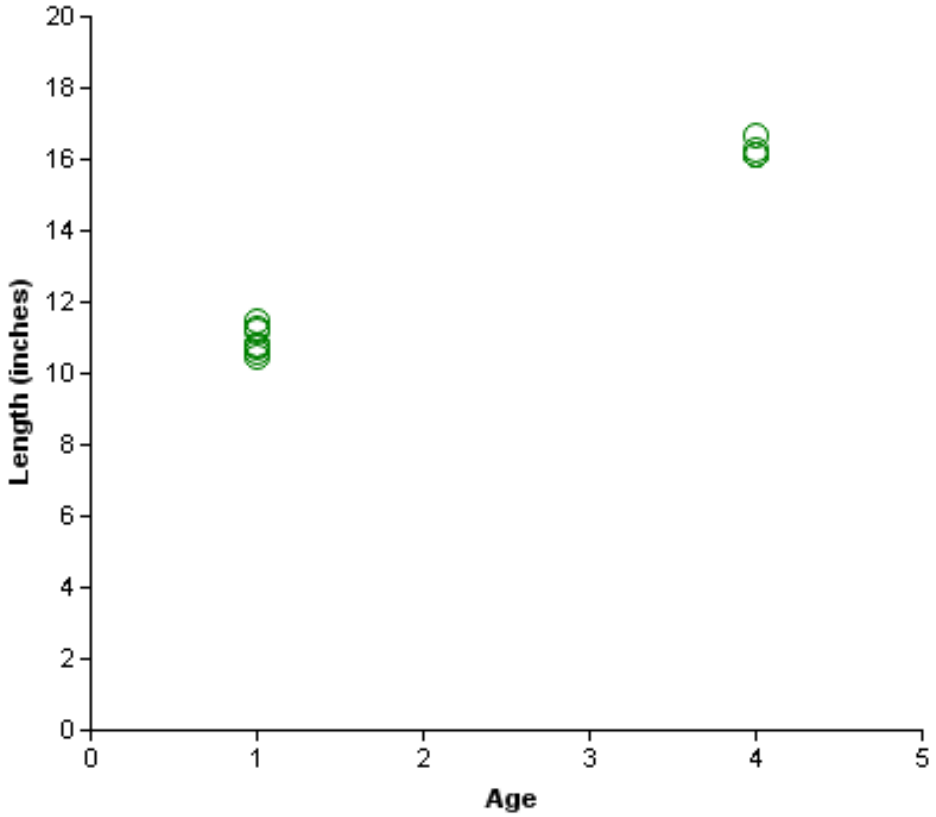


Figure 9. Length at age (inches) of all white bass (N=13) (sexes combined) collected in spring gill netting electrofishing, Lake Tyler West, Texas, March 2012.

White bass

Table 8. Creel survey statistics for white bass at Lake Tyler West from December 2004 through February 2005, March through May 2008, and March through May 2012 where total catch per hour is for anglers targeting all true basses and total harvest is the estimated number of white bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	Winter* 2004-2005	Spring 2008	Spring 2012
Directed effort (h)	0	0	212 (114)
Directed effort/acre	0	0	0.1 (117)
Total catch per hour		0	3.0 (0)
Total harvest		0	103 (879)
Harvest/acre		0	<0.1 (879)
Percent legal released	NA	NA	0

* Winter creel conducted from December through February

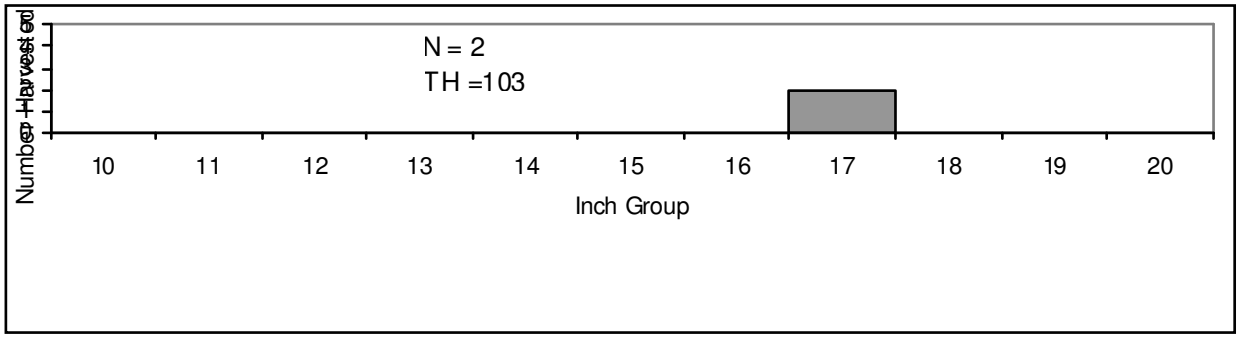


Figure 10. Length frequency of white bass observed during creel surveys at Lake Tyler West, Texas, March–May 2012, all anglers combined. N is the number of harvested catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth bass

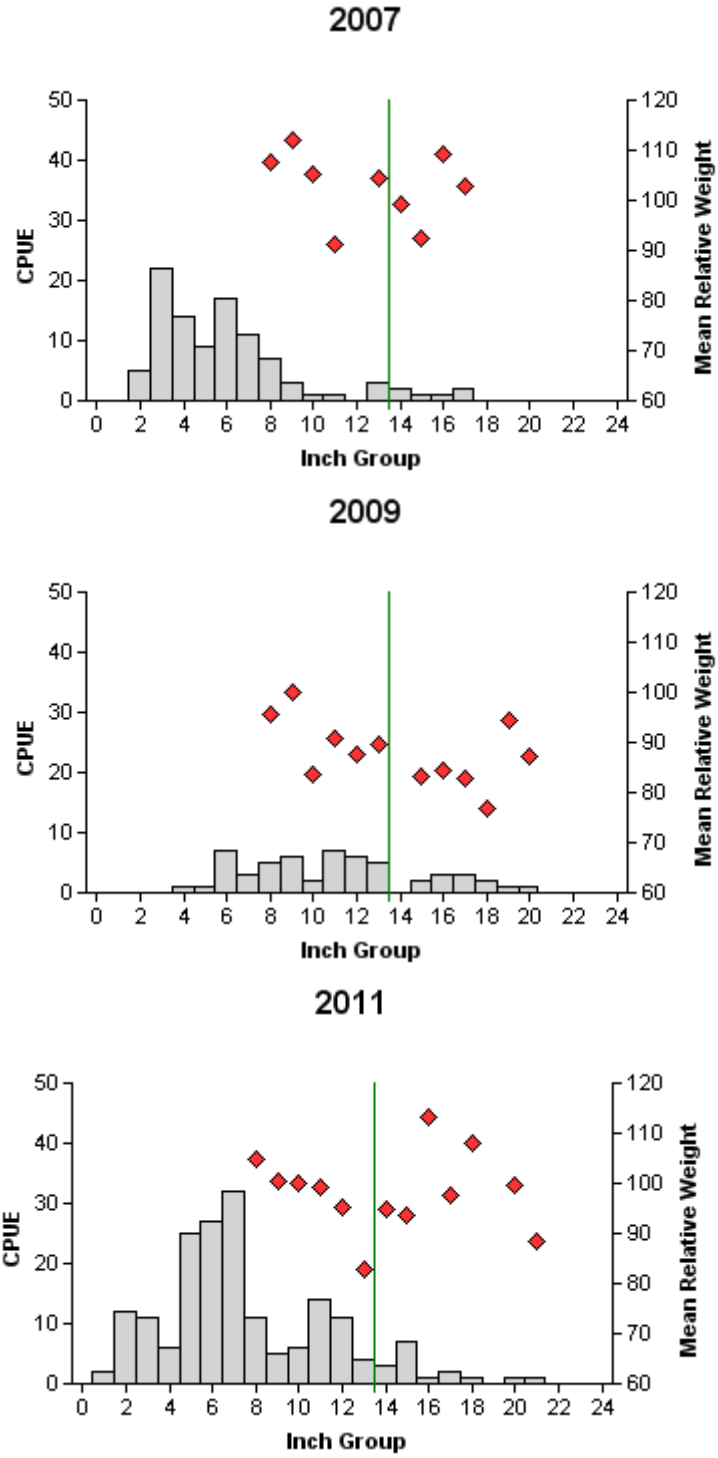


Figure 11. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE are in parentheses) for fall electrofishing surveys, Lake Tyler West, Texas, 2007, 2009, and 2011. Vertical line represents length limit at time of survey.

Largemouth bass

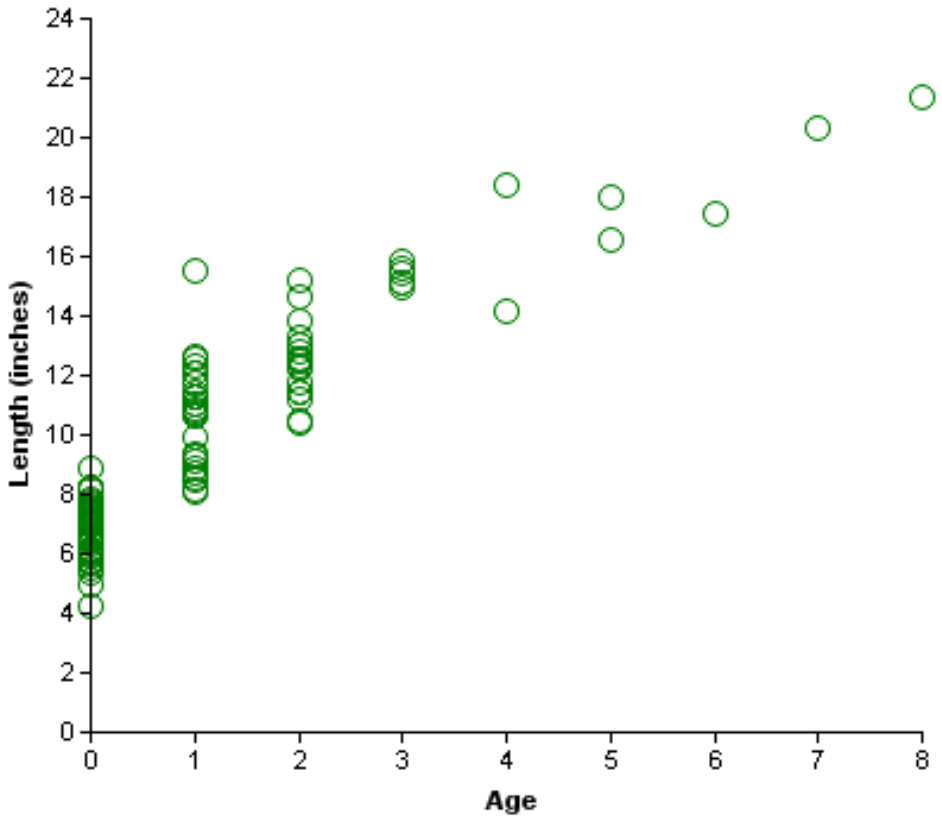


Figure 12. Length at age (inches) of largemouth bass (N=111) (sexes combined) collected in fall electrofishing, Lake Tyler West, Texas, September 2011.

Largemouth bass

Table 9. Creel survey statistics for largemouth bass at Lake Tyler West from December 2004 through February 2005, March through May 2008, and March through May 2012 where total catch per hour is for anglers targeting all largemouth bass, and total harvest is the estimated number of largemouth bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	Winter* 2004/2005	Spring 2008	Spring 2012
Directed effort (h)	3,919 (17)	15,039 (22)	14,592 (18)
Directed effort/acre	1.8 (17)	6.7 (22)	6.6 (18)
Total catch per hour	0.6 (19)	0.5 (41)	1.0 (16)
Total harvest	210 (41)	3,898 (72)	3,192 (56)
Traditional Harvest	na	na	191 (56)
Tournament retained	na	na	3,001 (56)
Harvest/acre	<0.1 (41)	1.8 (72)	1.4 (56)
Percent legal released	na	82	33

* Winter creel conducted from December through February

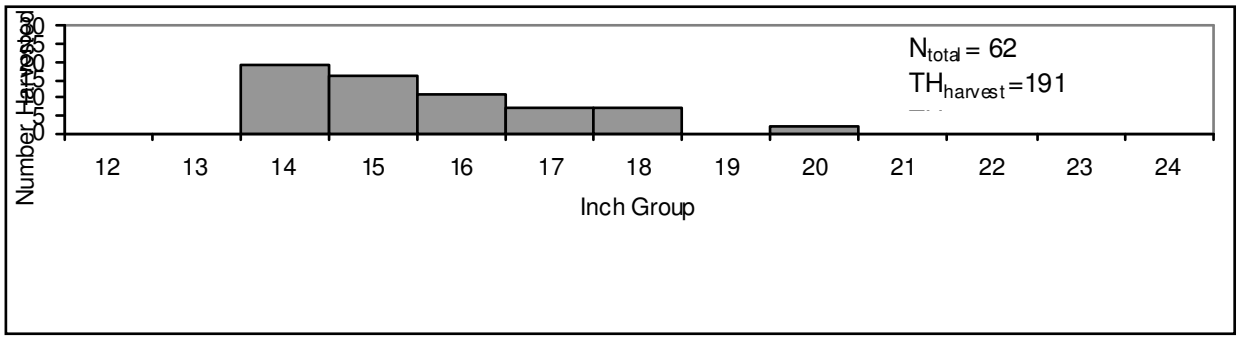


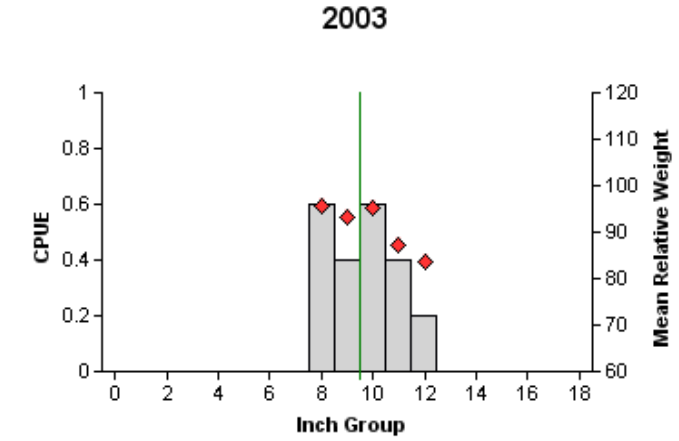
Figure 13. Length frequency of harvested largemouth bass observed during creel surveys at Lake Tyler West, Texas, March–May 2012, all anglers combined. N_{total} is the total number of largemouth bass observed during the angler creel survey. TH_{LR} is the expanded number of largemouth bass in possession by tournament anglers and later released. $TH_{harvest}$ is the expanded number of harvested largemouth bass.

Largemouth bass

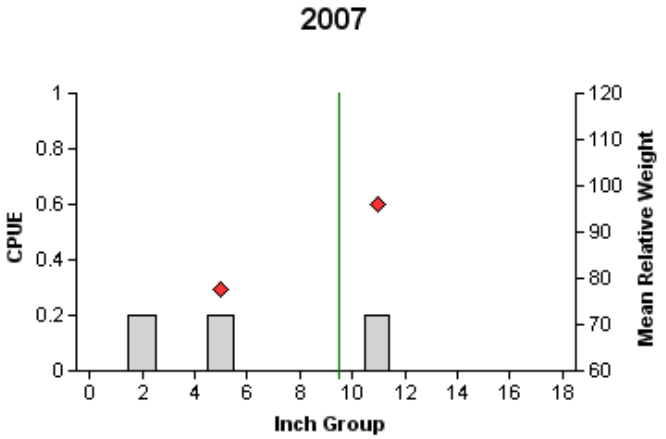
Table 10. Results of genetic analysis of largemouth bass collected by fall electrofishing at Lake Tyler West, Texas, 1993, 1996, 1999, 2001, 2007, and 2011. In 2007 Microsatellite DNA analysis was used to determine largemouth bass genetic composition, and results are not directly comparable to historic data; determination of integrade status was unavailable. FLMB=Florida largemouth bass, NLMB=Northern largemouth bass, F1=first generation hybrid between a FLMB and a NLMB, Fx=second or higher generation hybrid between a FLMB and a NLMB.

Year	Sample size	Genotype				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
1993	28	3	3	14	8	35.7	10.7
1996	30	2	13	8	7	37.5	6.7
1999	30	0	6	17	7	30.8	0.0
2001	30	0	7	21	2	42.5	0.0
2007	30	0			0	42.6	0.0
2011	30	1	0	28	1	40.0	3.3

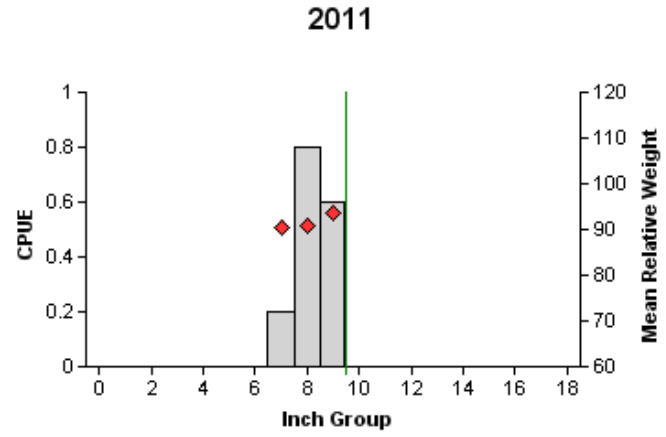
White crappie



Effort = 5.0
Total CPUE = 2.2 (53; 11)
Stock CPUE = 2.2 (53; 11)
PSD = 100 (0)
PSD-10 = 55 (22.3)



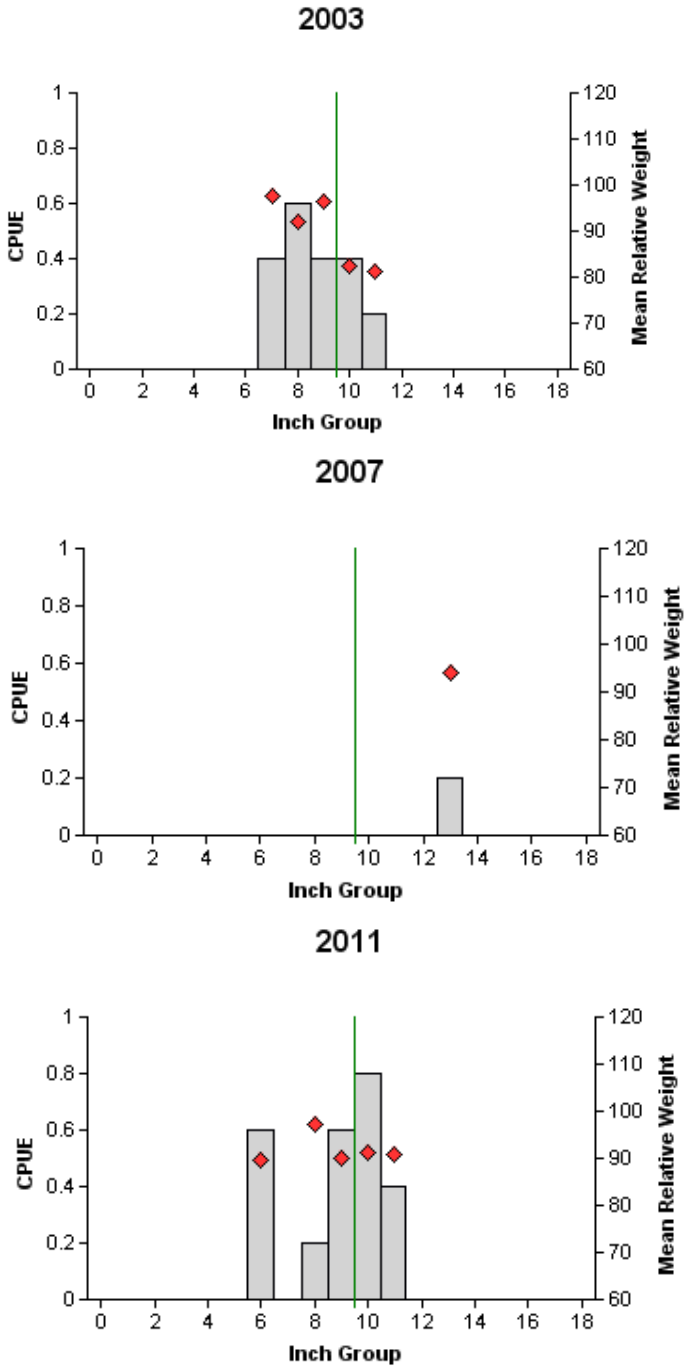
Effort = 5.0
Total CPUE = 0.6 (100; 3)
Stock CPUE = 0.4 (100; 2)
PSD = 50 (0)
PSD-10 = 50 (0)



Effort = 5.0
Total CPUE = 1.6 (73; 8)
Stock CPUE = 1.6 (73; 8)
PSD = 88 (5.2)
PSD-10 = 0 (0)

Figure 14. Number of white crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Tyler West, Texas, 2003, 2007, and 2011. Vertical line represents length limit at time of survey.

Black crappie



Effort =	5.0
Total CPUE =	2.0 (47; 10)
Stock CPUE =	2.0 (47; 10)
PSD =	80 (13.8)
PSD-10 =	30 (12.4)

Effort =	5.0
Total CPUE =	0.2 (100; 1)
Stock CPUE =	0.2 (100; 1)
PSD =	100 (0)
PSD-10 =	100 (0)

Effort =	5.0
Total CPUE =	2.6 (34; 13)
Stock CPUE =	2.6 (34; 13)
PSD =	77 (12.4)
PSD-10 =	46 (23.1)

Figure 15. Number of black crappie caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Tyler West, Texas, 2003, 2007, and 2011. Vertical line represents length limit at time of survey.

Crappie

Table 11. Creel survey statistics for crappie at Lake Tyler West from December 2004 through February 2005, March through May 2008, and March through May 2012 where total catch per hour is for anglers targeting all crappie and total harvest is the estimated number of crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year		
	Winter* 2004/2005	Spring 2008	Spring 2012
Directed effort (h)	721 (51)	3,707 (30)	3,377 (31)
Directed effort/acre	0.3 (51)	1.7 (30)	1.4(31)
Total catch per hour	0.0 (0)	1.7 (38)	4.8 (50)
Total harvest	0 (0)	3,297 (56)	5,177 (70)
White crappie	0 (0)	987 (83)	1,546 (88)
Black crappie	0 (0)	2,310 (45)	3,631 (63)
Harvest/acre	0 (0)	1.5 (56)	2.0 (70)
White crappie	0.0 (0)	0.4 (83)	0.7 (88)
Black crappie	0.0 (0)	1.0 (45)	1.4 (63)
Percent legal released	na	<1.0	3

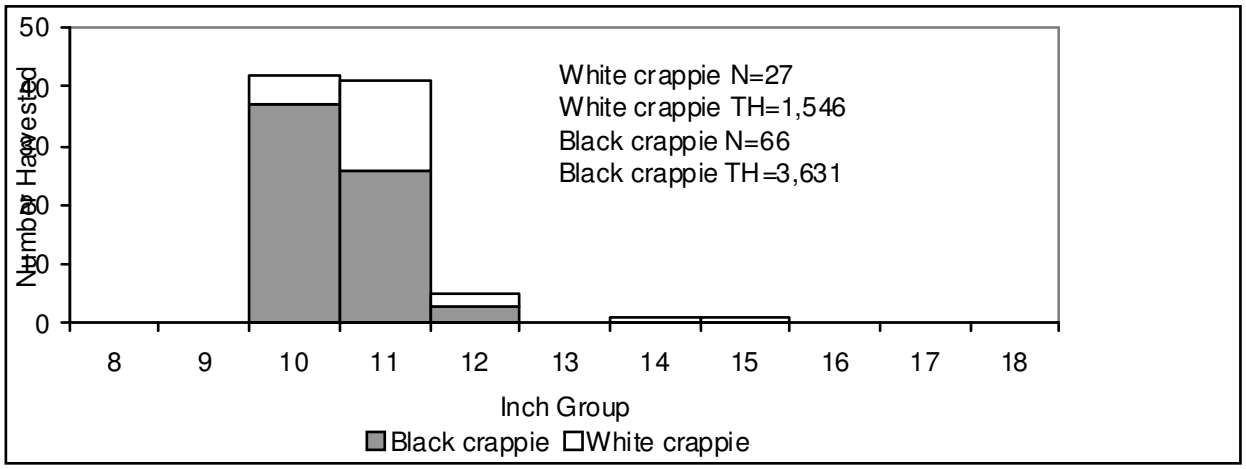


Figure 16. Length frequency of harvested white crappie and black crappie observed during creel surveys at Lake Tyler West, Texas, March-May 2012, all anglers combined. N is the number of harvested white crappie and black crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 12. Proposed sampling schedule for Lake Tyler West, Texas. Gill netting surveys are conducted in the spring while electrofishing is conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

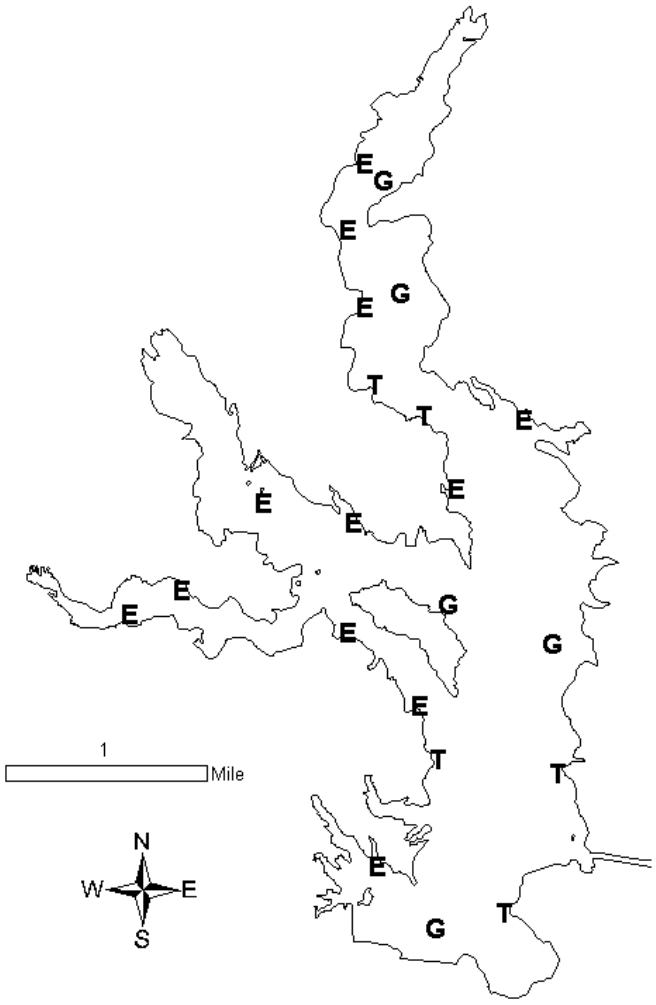
Survey Year	Electrofishing	Access	Gill Net	Habitat	Creel	Report
2012-2013				A		
2013-2014	A			A		
2014-2015				A		
2015-2016	S	S	S	S	A	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Tyler West, Texas, 2011-2012.

Species	Gill netting		Trap netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard shad					29	29.0
Threadfin shad					69	69.0
Channel catfish	35	7.0				
Flathead catfish	1	0.2				
White bass	61	12.2			1	1.0
Redbreast sunfish					60	60.0
Warmouth					8	8.0
Bluegill					443	443.0
Longear sunfish					7	7.0
Redear sunfish					226	226.0
Redspotted sunfish					1	1.0
Largemouth bass					182	182.0
White crappie			8	1.6		
Black crappie			13	2.6		

APPENDIX B



Location of sampling sites, Lake Tyler West, Texas, 2011-2012. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively.